INTRODUCTION TO GLOBAL AND PACIFIC RIM LNG MARKETS

a Presentation to the

California Energy Commission Workshop on

LNG Access Issues and Security of Supply

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IN THE 46 YEARS SINCE THE VOYAGE OF THE "METHANE PIONEER" FROM LAKE CHARLES, LOUISIANA TO CANVEY ISLAND IN THE U.K.

- LNG Has Been, Until Recently, Essentially a Regional Fuel

- After an Auspicious Beginning in the Atlantic Basin
  European Demand Slowed
  The U.S. Market Collapsed
  And LNG Activity Was Largely Confined to the
  Asia Pacific Region

- Now, Since the Late 90s
  The Atlantic Basin Trade Has Reemerged
  And the Middle East Has Become a Major Supplier
  to Both Asia and the Atlantic

Figure 1

GROWTH OF LNG IMPORTS BY MARKET REGION

BCFD

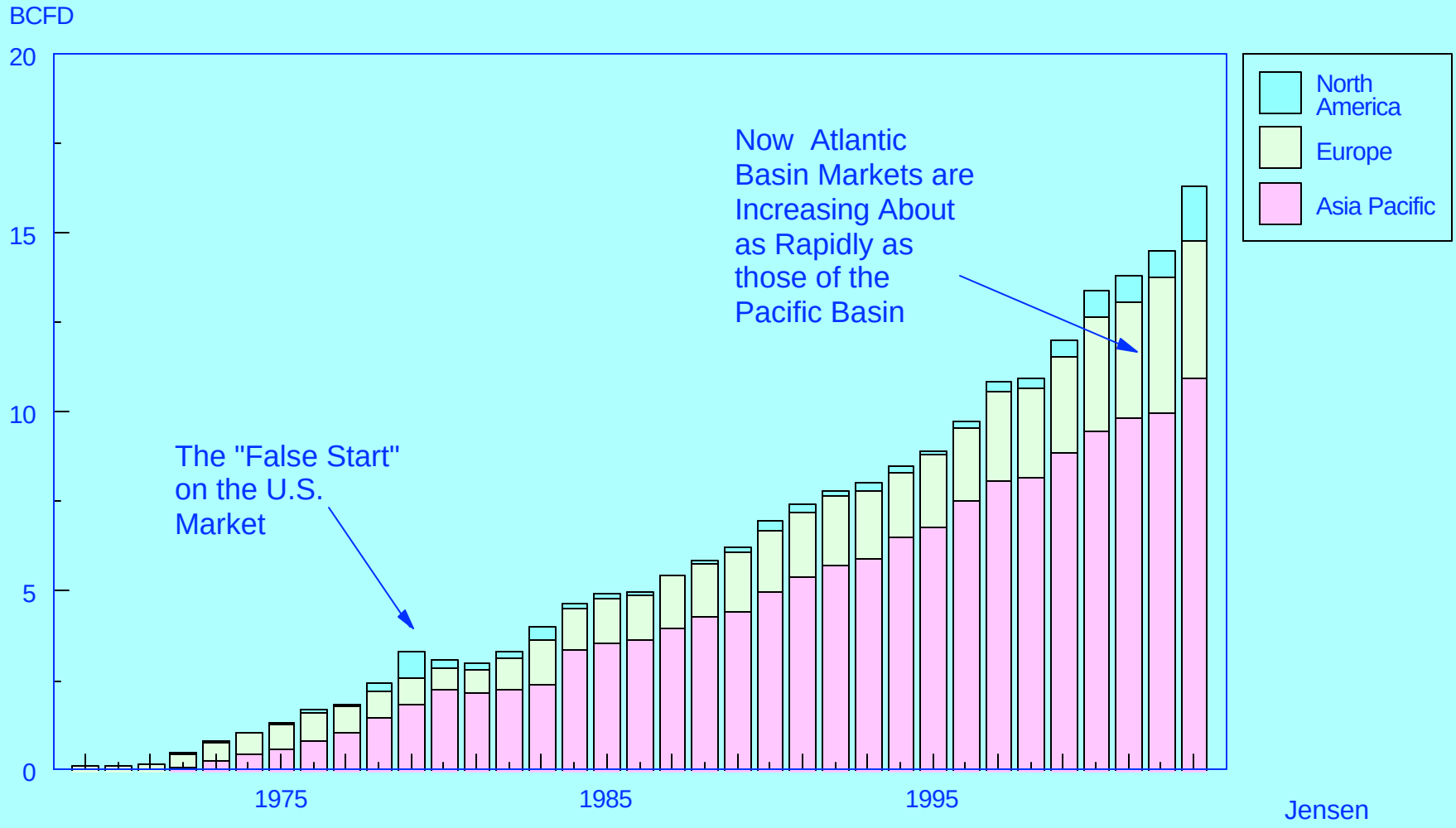


Figure 2

GROWTH OF LNG EXPORTS BY SOURCE

BCFD

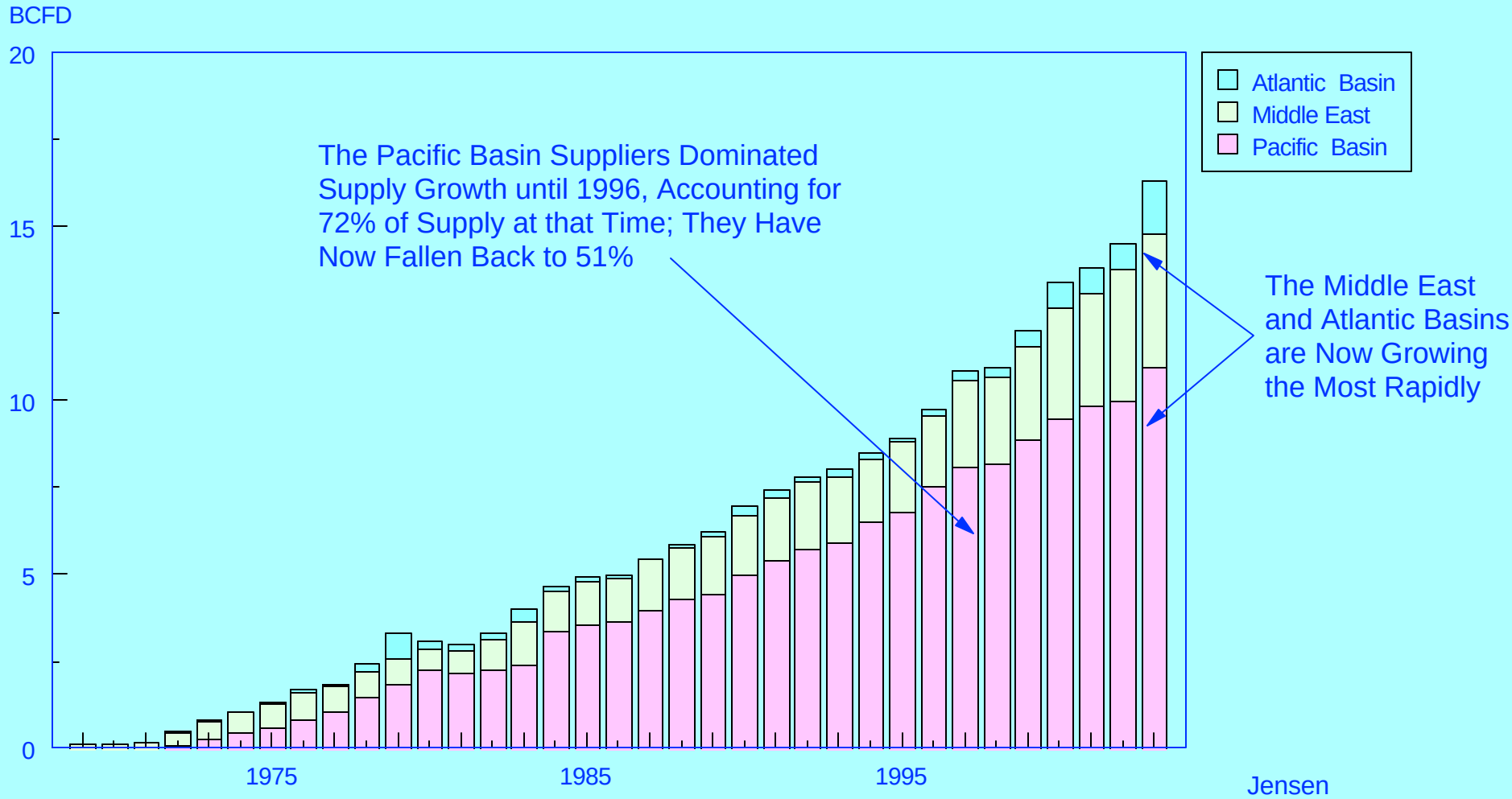
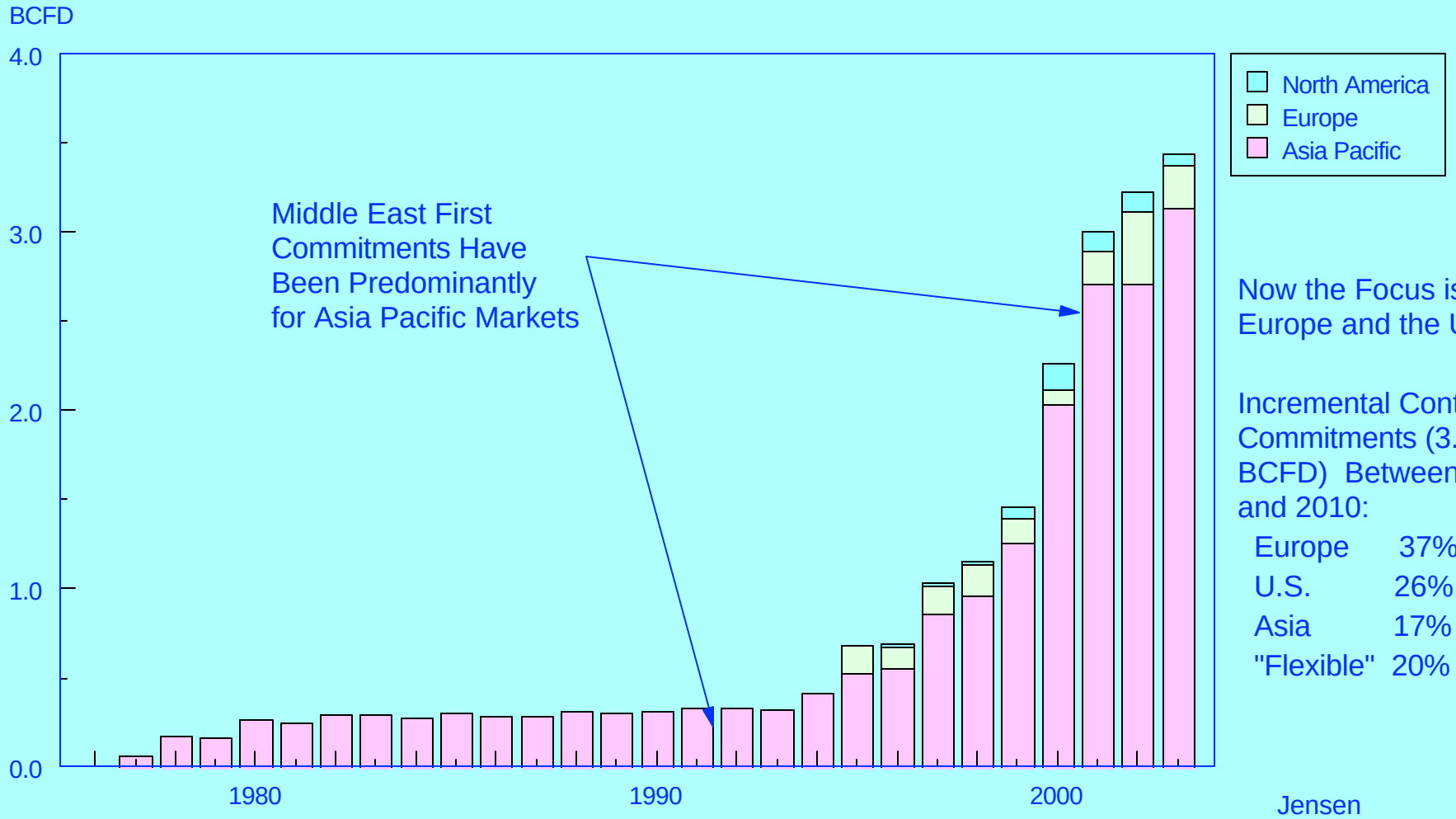


Figure 3
THE RAPID MIDDLE EAST EXPANSION AND SHIFT IN EXPORT FOCUS FROM THE PACIFIC BASIN TO THE ATLANTIC BASIN
BCFD



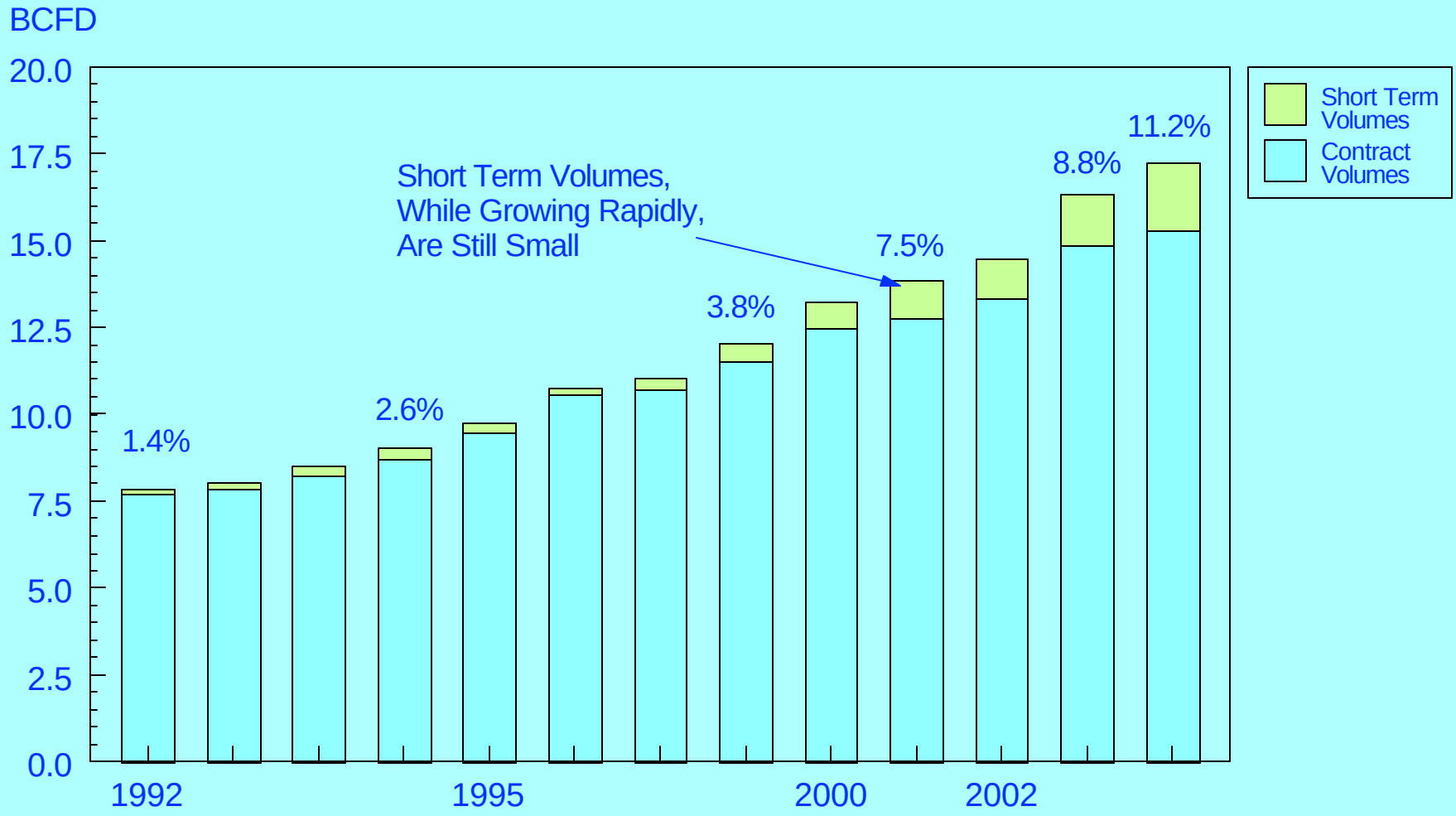
IN THIS NEW ENVIRONMENT, LNG TRADE HAS TAKEN ON SOME OF THE CHARACTERISTICS OF COMPETITIVE COMMODITY MARKETS

- There is Now a Small, But Growing, Short Term Market for LNG
- And Long Term Contracts - Once Quite Rigid - Are Becoming Much More Flexible
- But it is Unlikely That the Global LNG Market Will Ever be as Flexible as its Two Ostensible Parents - Liberalized Onshore Pipeline Markets or the World Oil Market

Figure 4

LNG TRADE SHOWING THE GROWING ROLE OF SHORT TERM SALES

BCFD



LNG PROJECTS CONSIST OF A "CHAIN" OF INTERLINKED INVESTMENTS WHICH TRADITIONALLY HAVE BEEN HELD TOGETHER BY LONG TERM CONTRACTS

- The Centerpiece of These Contracts - the "Sale and Purchase Agreement" or SPA - Linked Creditworthy Buyers and Creditworthy Sellers Making the Project Financible

- The Risk Sharing Logic of the SPA Was Embodied in the Phrase ... "The Buyer Takes the Volume Risk and the Seller Takes the Price Risk"

- Hence, Contracts Typically Included a Take-or-Pay Provision to Insure Buyer Offtake at Some Minimum Level and a Price Escalation Clause to Transfer Market Price Uncertainty to the Seller

- In Addition, Since Buyers Were Commonly Regulated Utilities or Government Monopoly Companies, They Were Able to Lay Off Much of the Volume Risk to Their Ratepayers

- Despite the Rapid Growth of Short Term Trading, Short Term Volumes Remain Small and No New LNG Facility Has Been Launched Without a Long Term "Anchor" Contract

- Thus Industry Reliance on Long Term Contracting is Likely to Remain, Acting as a "Filter" to Determine the Flow of New Projects into the Market

- However, The Restructuring of the Downstream Industry Has Made it Increasingly Difficult to Find Buyers Who Can Assume the Traditional Buyer's Risk; As a Result, Risk Has Migrated Upstream

- The Traditional Contract Linked Specific Liquefaction Facilities with Specific Customers, Usually with Dedicated Tankers for Transportation

- This Might be Described as "Destination Contracting" Since the Ultimate Market Was Specified in the Contract
- Some Sellers Now Seek to Mitgate Risks by Integrating Downstream Through "Self-Contracting" With Their Own Marketing Affiliates, Thereby Keeping Their Destination Options Open
- This Might be Described as "System Contracting"; It is Much More Flexible Than "Destination Contracting"
- The Ultimate Destination of This "System Contracting" is Less Obvious Since it is Determined by the Regional Distribution of the Company's Portfolio of Receipt Terminal and Marketing Assets

THIS EMERGING STRUCTURE OF GLOBAL GAS TRADE IS SUBSTANTIALLY DIFFERENT FROM THE TRADING PATTERNS IN THE RESTRUCTURED ONSHORE PIPELINE MARKET

- The Units of Trade Are Much Different
  The New York Mercantile Exchange Trades "Contracts"
  LNG Trades in "Cargoes"

- A NYMEX Contract is 10 Million Cubic Feet

- For a Typical 138,000 Cubic Meter LNG Tanker, the Cargo Size is 2,850 Million Cubic Feet, Nearly 300 Times as Large

- While Spot Trading of Pipeline Gas Approaches the Instantaneous, a Tanker Voyage May Take as Much as Three Weeks Between Loading and Discharge

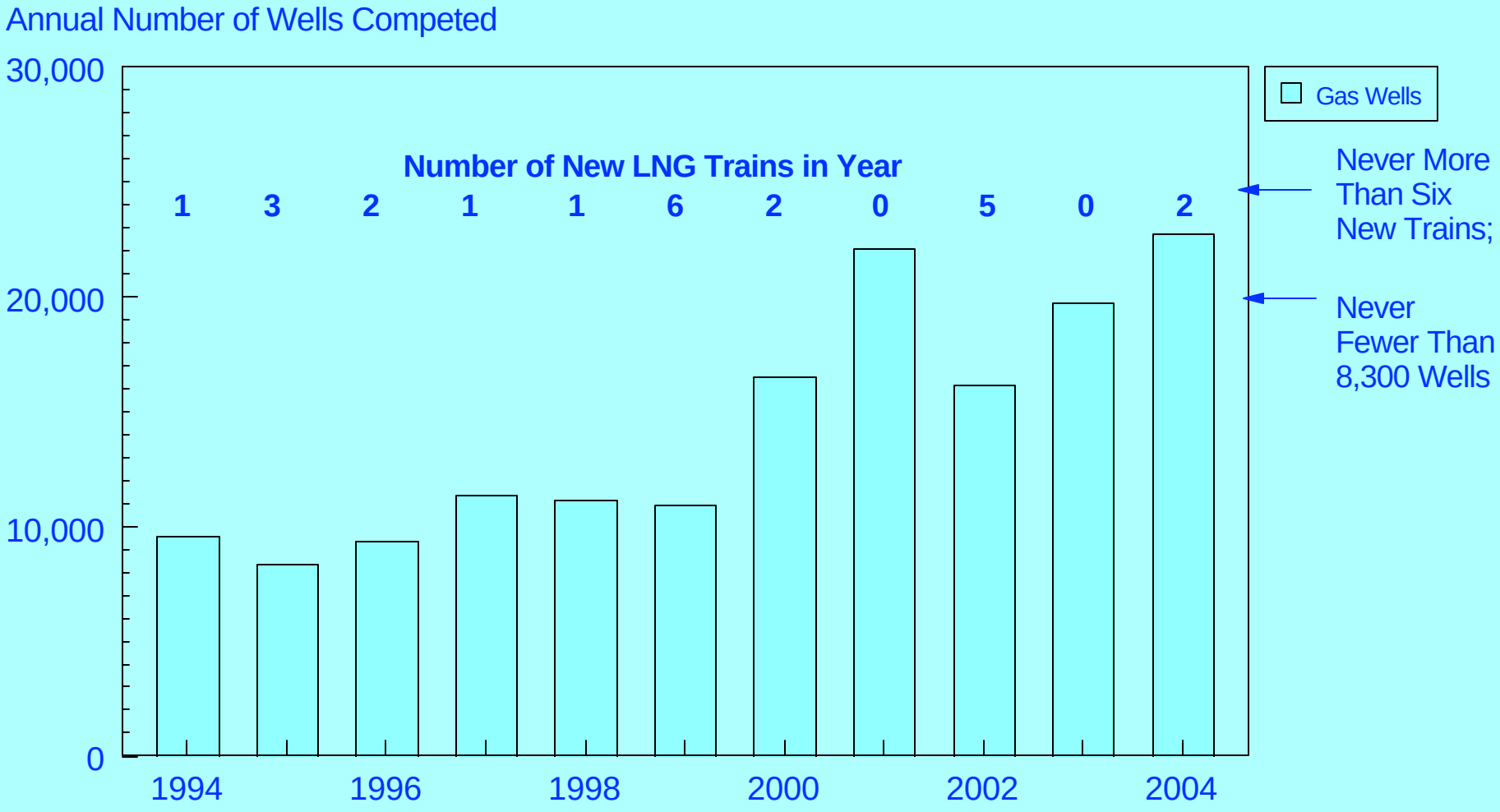
- And LNG Competition is Among a Limited Number of Projects - "Project Supply" - Rather Than Among a Very Large Number of Competing Producers - "Commodity Supply"

- The Sharp Difference in Transaction Activity Between Conventional U.S. Exploration and Development and LNG Projects is Illustrated by Figure 5

- Over the Past Decade, the Number of Completed U.S. Gas Wells Has Varied from 8,354 to 22,673; In Sharp Contrast, the Number of New LNG Trains Completed During the Same Period has Varied from zero to 6

Figure 5

THE NUMBER OF U.S. NATURAL GAS WELLS COMPLETED COMPARED WITH THE NUMBER OF LNG TRAINS COMPLETED FOR ALL WORLDWIDE MARKETS - 1994/2004



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THE DECISION AS TO WHETHER TO REQUIRE OPEN ACCESS TO LNG TERMINALS IS A DECISION WITH A FOOT IN BOTH THE "COMMODITY SUPPLY" AND "PROJECT SUPPLY" CAMPS

- Looking Downstream, the LNG Terminal is Just Another Link in the Gas Transportation System Designed to Benefit from Competitive Transportation Access

- However, Looking Upstream, the LNG Terminal is a Small Link in a Chain - Perhaps 15% of the Overall Capital Budget - and Faces, Not Commodity Offerings from Many Producers, But Only a Few Offerings from Several Projects

- In Europe, the EU Policy is to is to Look Downstream, Treating LNG Terminals as Part of the Transportation System and Requiring Third Party Access

- But the U.K., in Exempting its South Hook Project, Chose to Look Upstream, Treating the Project as a Production Facility; This Was Also FERC's Approach In "Hackberry"

IN THE NEW WORLD OF "SYSTEM CONTRACTING" AS DISTINCT FROM "DESTINATION CONTRACTING"

- Flexibility to Arbitrage Among Different Destinations, as Regional Market Conditions Dictate, is a Major Objective
- This Requires Some Surplus Capacity in the System, if the Supplier is to Redirect His Cargoes to the Appropriate Market
- This Extra Capacity is Not Costless, But it is Cheaper to Maintain Surplus Capacity in Terminals Than it is in Either Tankers or Liquefaction

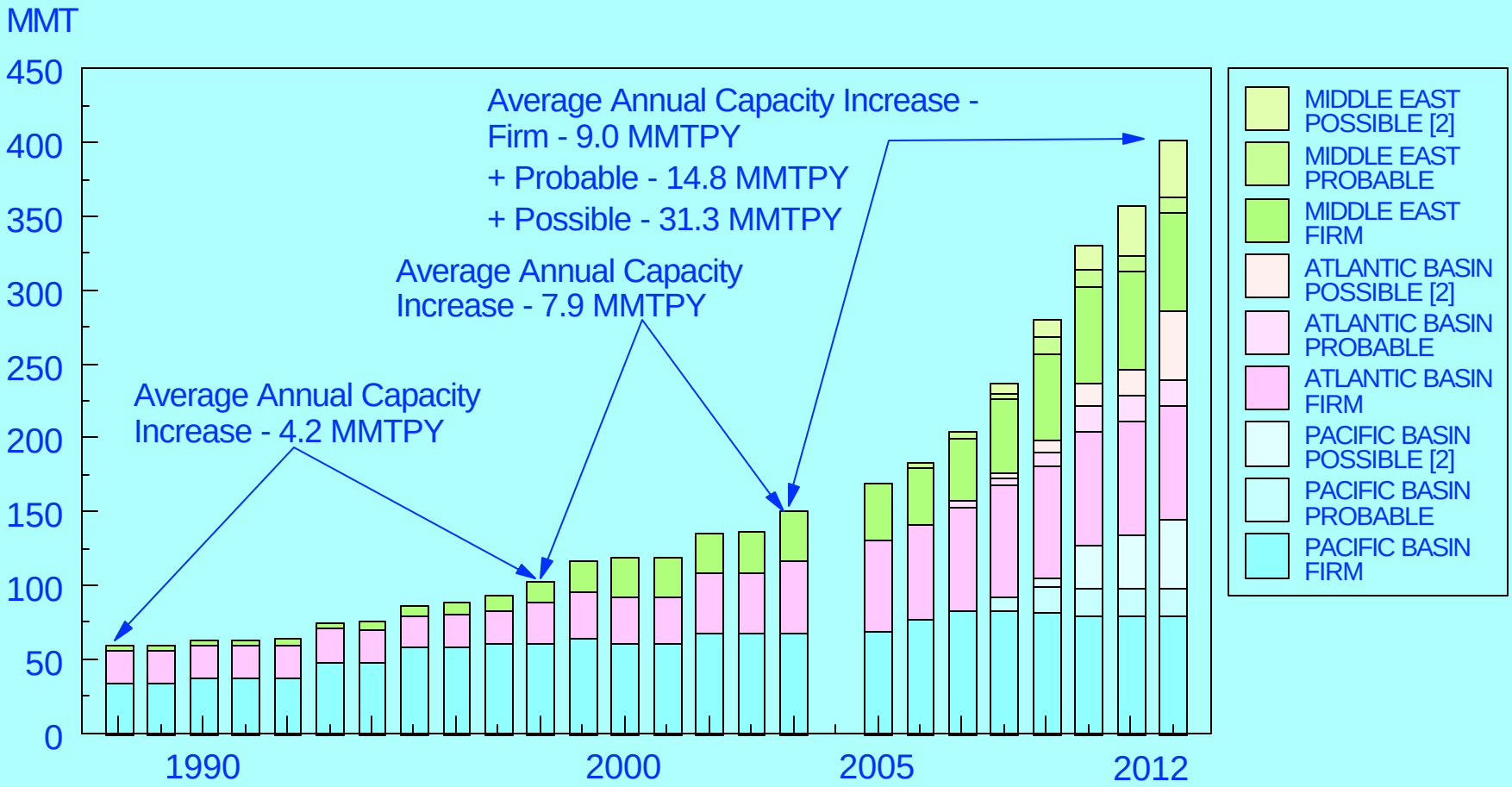
LNG'S GROWTH RATE IS NOW ACCELERATING

- One Way of Projecting the Near Term Future of LNG Trade is to Develop a Schedule of the Likely Development of Specific Liquefaction Projects
- Because Many Projects Reported in the Trade Press Fail to Meet Their Scheduled Startups or Are Abandoned Altogether, It is Necessary to Make Independent Judgments as to Which Projects Will Go Forward and When
- Figure 6 Shows One Such Classification Broken Down by Region, as Well as By "Firm", "Probable" and "Possible" Rankings; a "Remote" Category is Not Included

Figure 6

HISTORY AND FORECAST [1] OF FIRM, "PROBABLE" AND "POSSIBLE" LNG LIQUEFACTION CAPACITY BY REGION

MILLION TONS OF LNG



[1] Jensen Estimates
[2] Placing Unscheduled Possibles in 2012

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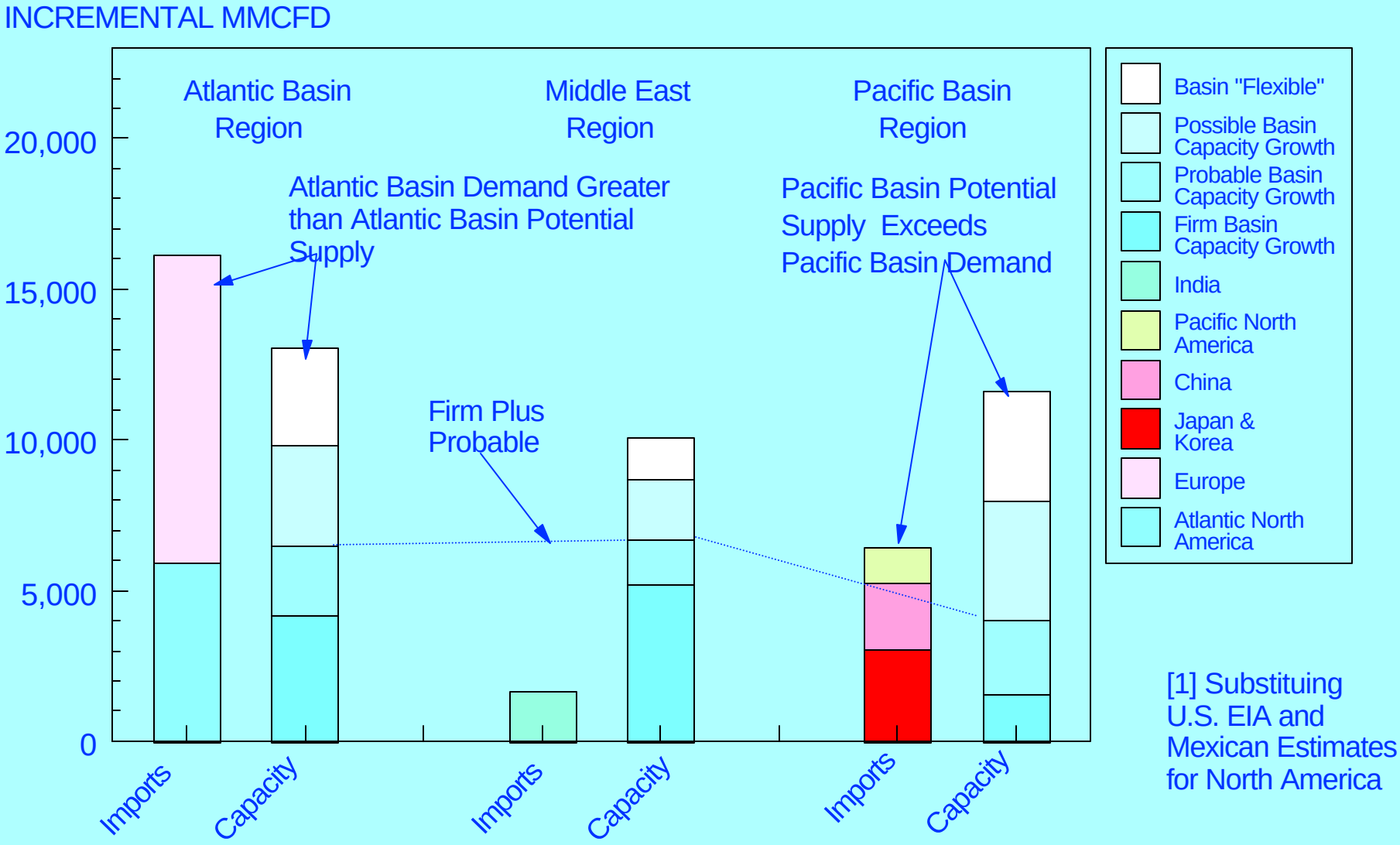
MARKET GROWTH PATTERNS ARE SHIFTING THE REGIONAL PATTERNS OF TRADE

- The Atlantic Basin (Europe and North America) Markets are Growing Most Rapidly, Overtaking Asian Demand
- This Strains Atlantic Basin Supplies, Offering Opportunities for the Middle East
- While Pacific Basin Supplies Are Currently Tight Because of Problems in Indonesia, in the Longer Term There May be Too Much Potential Supply Chasing Too Little Market Growth
- The Wild Cards in Pacific Rim Demand are China and the North American West Coast

Figure 7

IEA'S [1] ESTIMATED REGIONAL GROWTH IN SELECTED TOTAL IMPORTS (INCLUDING PIPELINE) FROM A BASE YEAR 2002 TO 2010 COMPARED TO INCREMENTAL LIQUEFACTION CAPACITY COMMITMENTS BY REGION

MMCFD

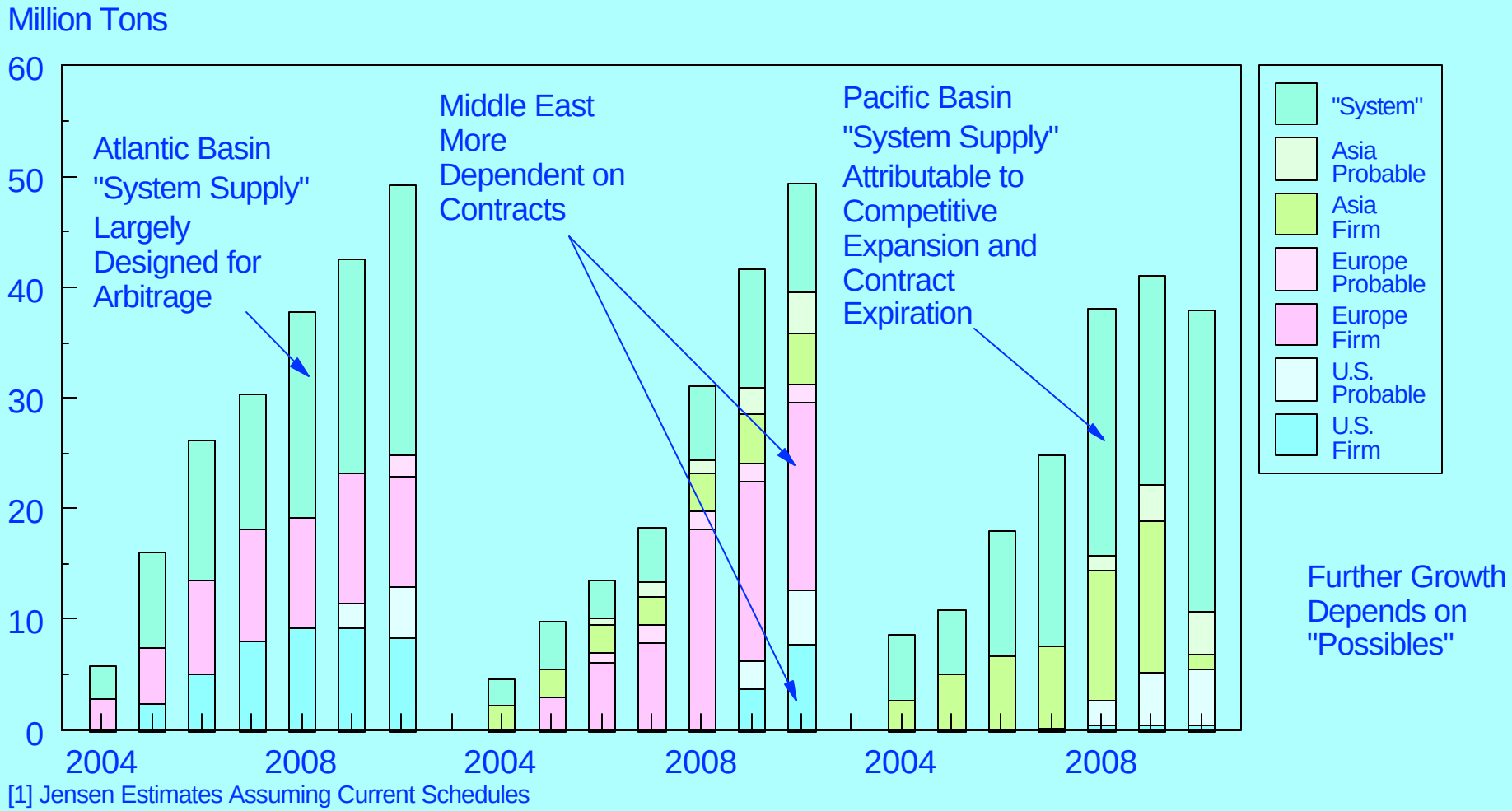


[1] Substituing U.S. EIA and Mexican Estimates for North America

IN THIS NEW PATTERN OF GLOBAL DEMAND GROWTH

- The Middle East, Most Remote from the Atlantic Basin and Northeast Asian Markets, Remains the Most Reliant on Long Term Contracts
- Atlantic Basin Supply, Where Price Arbitrage is Most Active, Has a High Proportion of the Flexible "System" Volumes
- Pacific Basin Supply Also Has a High Proportion of Uncommitted System Volumes
- This is Both Because of the Competition to Lauch New Greenfield Projects - Accepting Somewhat Less Contract Coverage than is Traditional - and Because of Forthcoming Contract Expirations

Figure 8
REGIONAL DESTINATION OF NEW (POST 2003) LNG CONTRACT SUPPLIES FROM OPERATING, "FIRM" AND "PROBABLE" [1] LIQUEFACTION PLANTS
BCM



- Figures 9, 10 and 11 Provide Estimates of the Contract Dedication Status for North America, Europe and the Asia Pacific Market
- In the Figures, a Significant Component of the Flexible "System Suppy" Has Been Allocated to the Various Markets Based on Recent Experience
- But Because of the Active Arbitrage Market, There is no Guarantee that the Flexible Supplies Will Actually Go to the Markets in Question

Figure 9

CONTRACTUAL DEDICATION TO NORTH AMERICAN MARKETS FROM OPERATING, "FIRM" AND "PROBABLE" [1] LIQUEFACTION PLANTS COMPARED WITH ACTUAL (ASSUMING U.S. RECEIVES 50% OF ATLANTIC BASIN AND 25% OF MIDDLE EAST FLEXIBLE VOLUMES)

BCFD

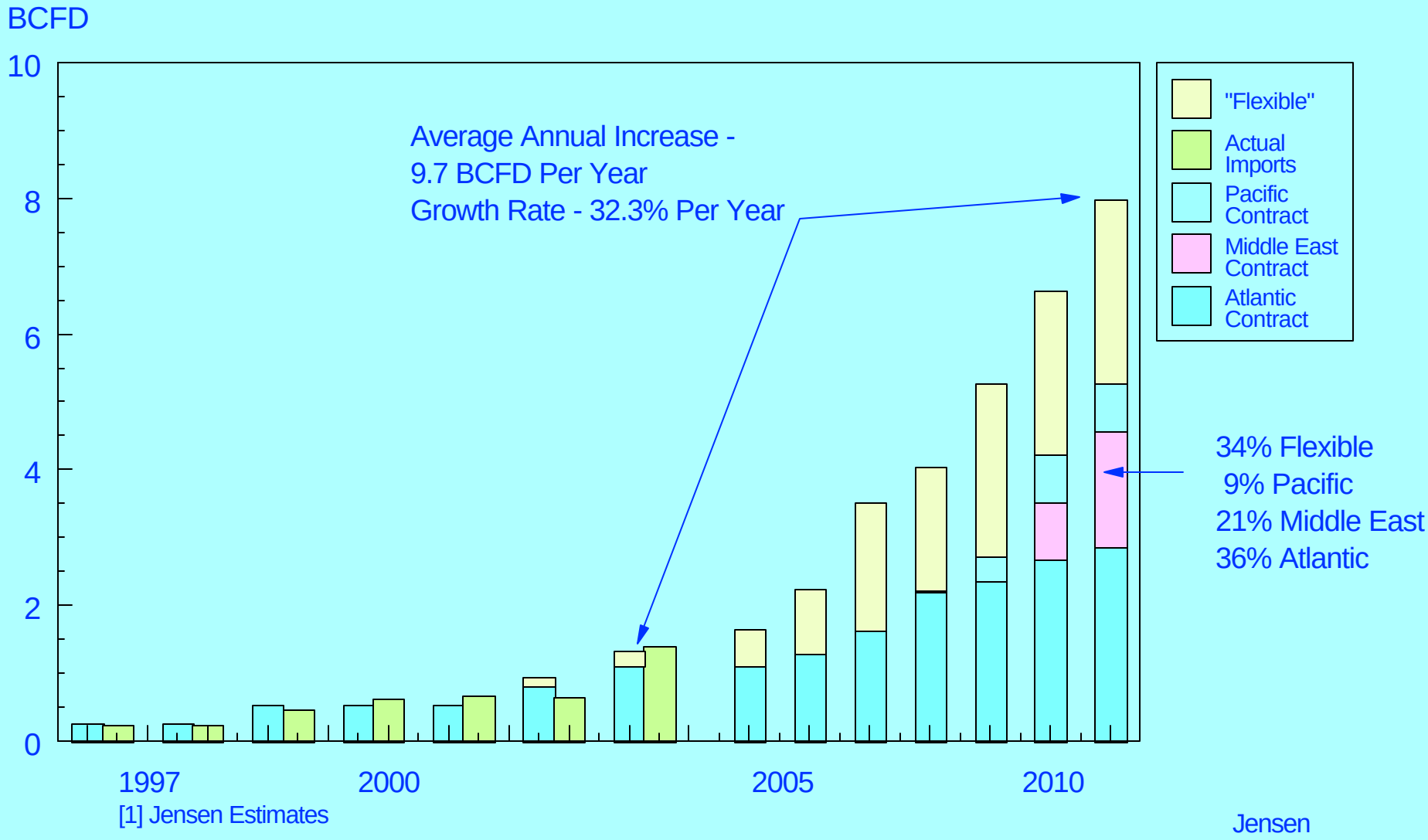


Figure 10

CONTRACTUAL DEDICATION TO EUROPEAN MARKETS FROM OPERATING, "FIRM" AND "PROBABLE" [1] LIQUEFACTION PLANTS COMPARED WITH ACTUAL (ASSUMING EUROPE. RECEIVES 50% OF ATLANTIC BASIN AND 60% OF MIDDLE EAST FLEXIBLE VOLUMES)

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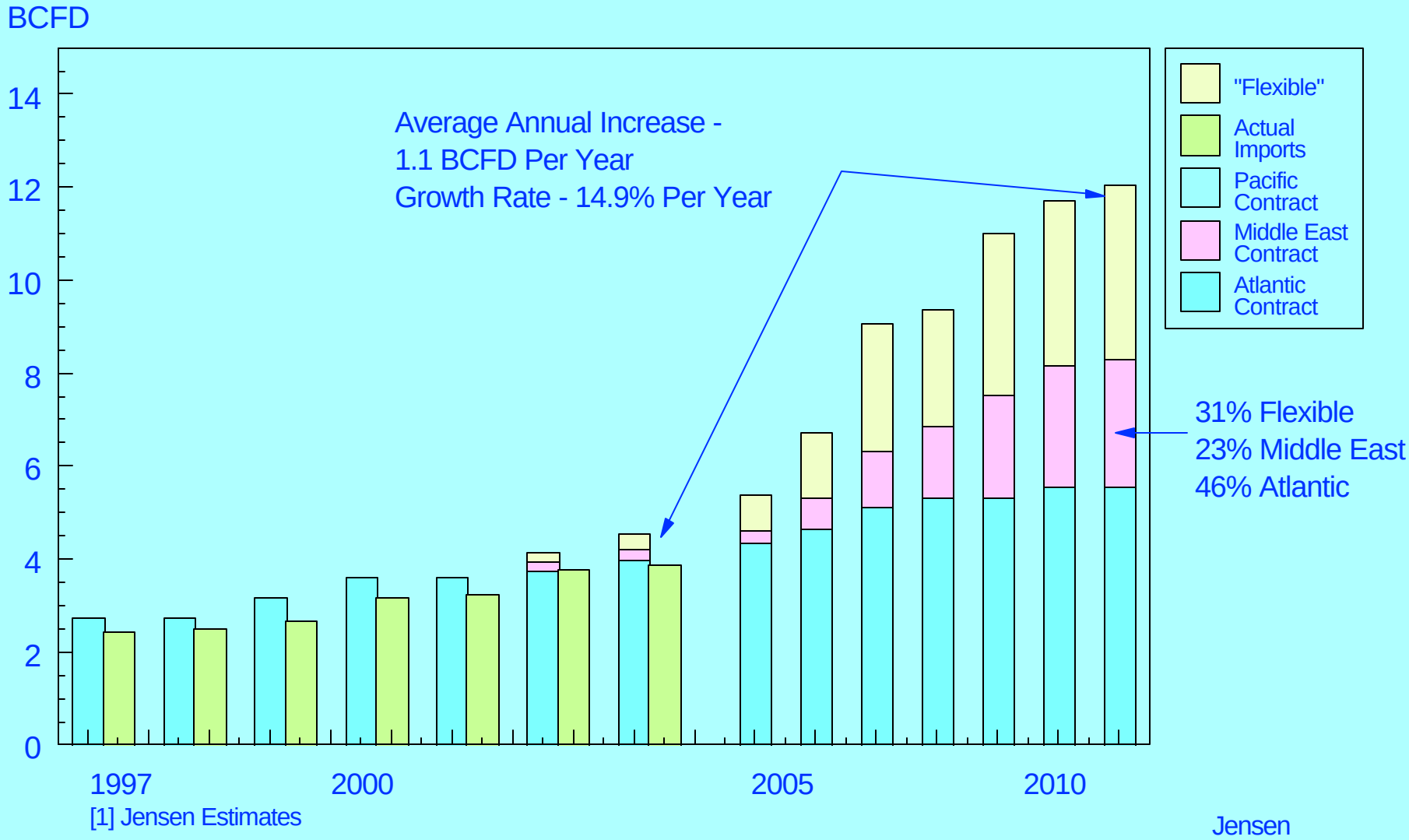

Figure 11

CONTRACTUAL DEDICATION TO ASIAN MARKETS FROM OPERATING, "FIRM" AND "PROBABLE" [1] LIQUEFACTION PLANTS COMPARED WITH ACTUAL (ASSUMING ASIA RECEIVES 100% OF PACIFIC BASIN AND 15% OF MIDDLE EAST FLEXIBLE VOLUMES)

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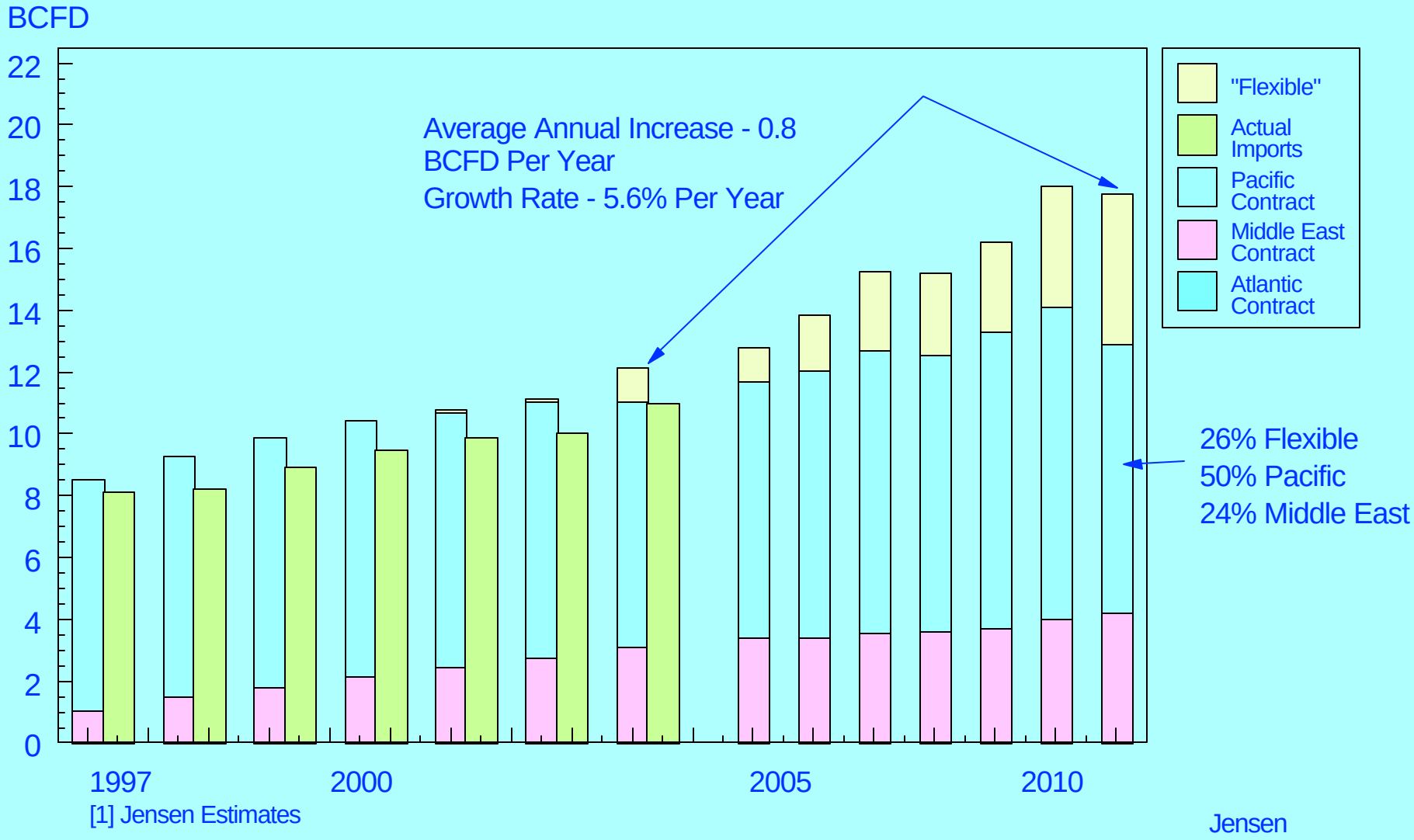
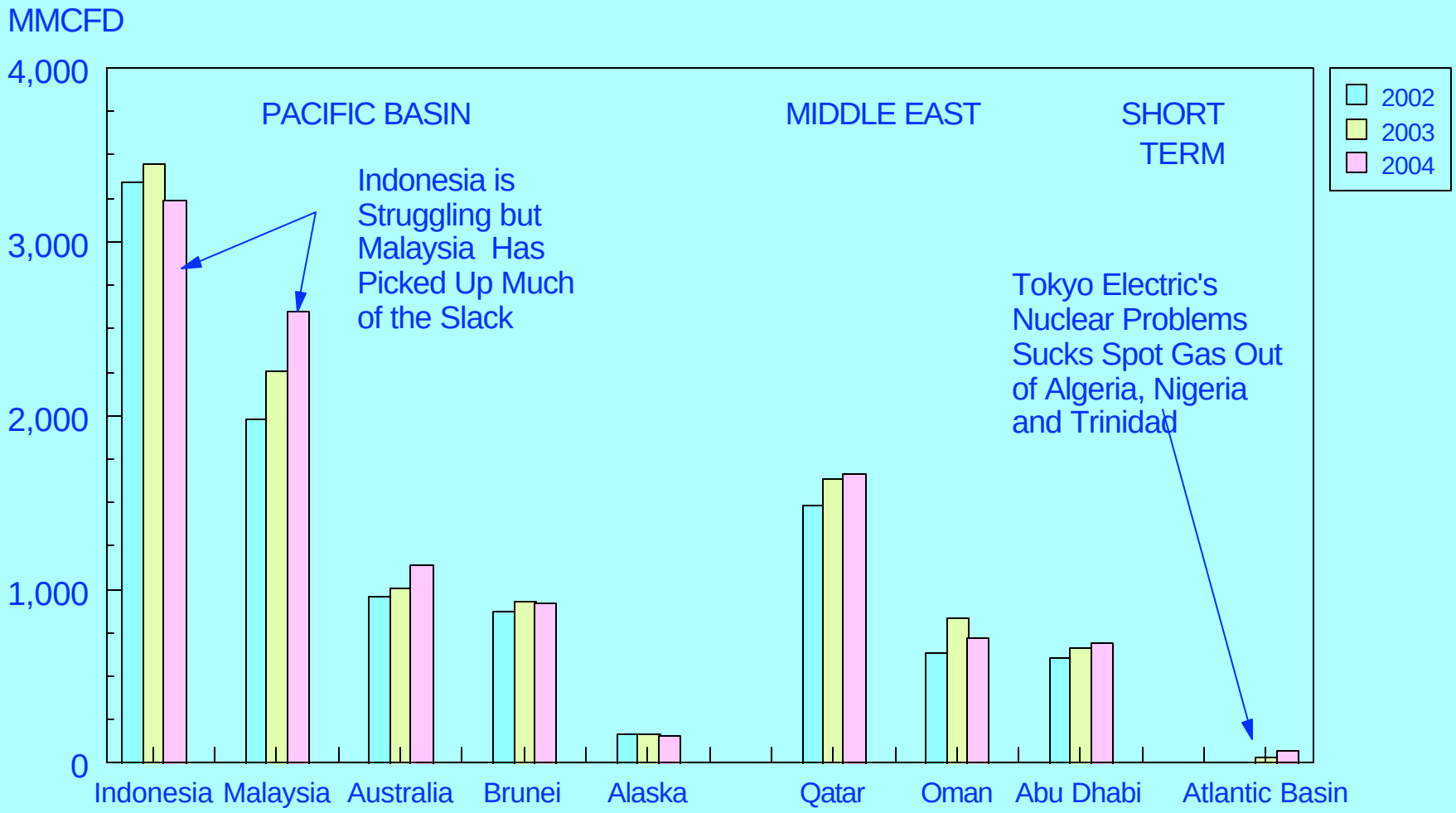


SUPPLY TO THE NORTHEAST ASIAN MARKET IN THE PACIFIC BASIN HAS BECOME VERY TIGHT OVER THE PAST TWO YEARS

- Indonesia is Suffering from Gas Field Depletion, Coupled with Poiltical Unrest, at Arun in Western Sumatra
- The Bontang Facility in Kalimantan Has Also Had Supply Problems, but They Seem to Be More Political/Bureaucratic than Physical
- Tokyo Electric Had a Nuclear Accident in Late 2002, and 17 Nuclear Plants Were Shut Down, Some for Nearly Two Years, Upsetting Both LNG and Oil Markets
- And Malaysia's Tiga Plant Had a Fire on Startup in 2003 That Took it Off Line for a Time

Figure 12
NORTHEAST ASIA LNG IMPORTS - 2002/2004
MMCFD



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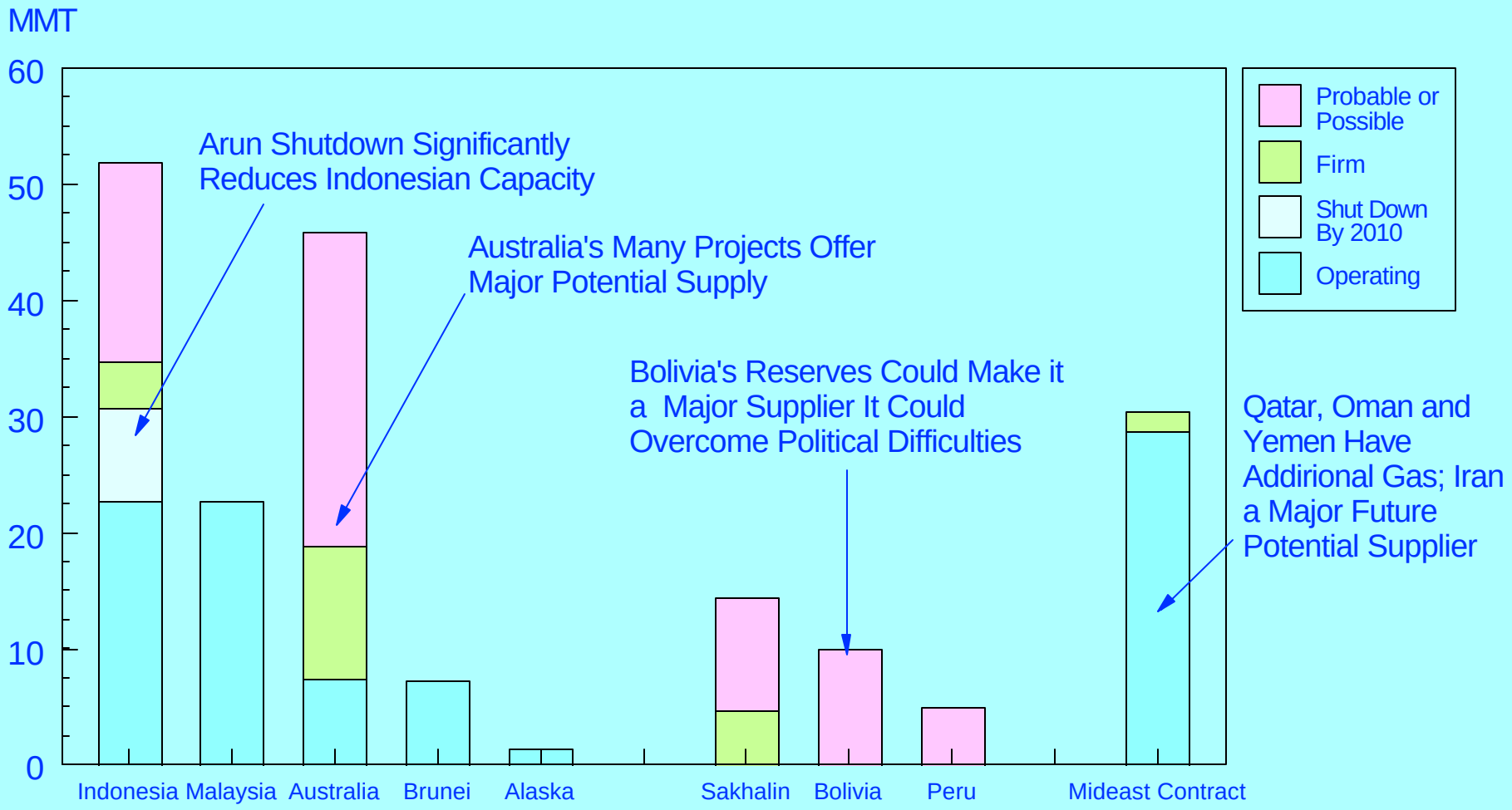
DESPITE THE CURRENT TIGHTNESS OF THE ASIA PACIFIC MARKET

- There are a Large Number of Potential New Supplies Available to the Region
- Australia is Particularly Well Situated to Bring New Projects on Line
- Indonesia, Despite the Pending Shut Down of Arun, Has Additional Supply as an Offset - Particularly at Tangguh
- And the Middle East Could Once Again Turn its Attention to Pacific Basin Markets

Figure 13
ASIA PACIFIC LNG CAPACITY POTENTIALLY AVAILABLE BY 2010
MILLION TONS OF LNG



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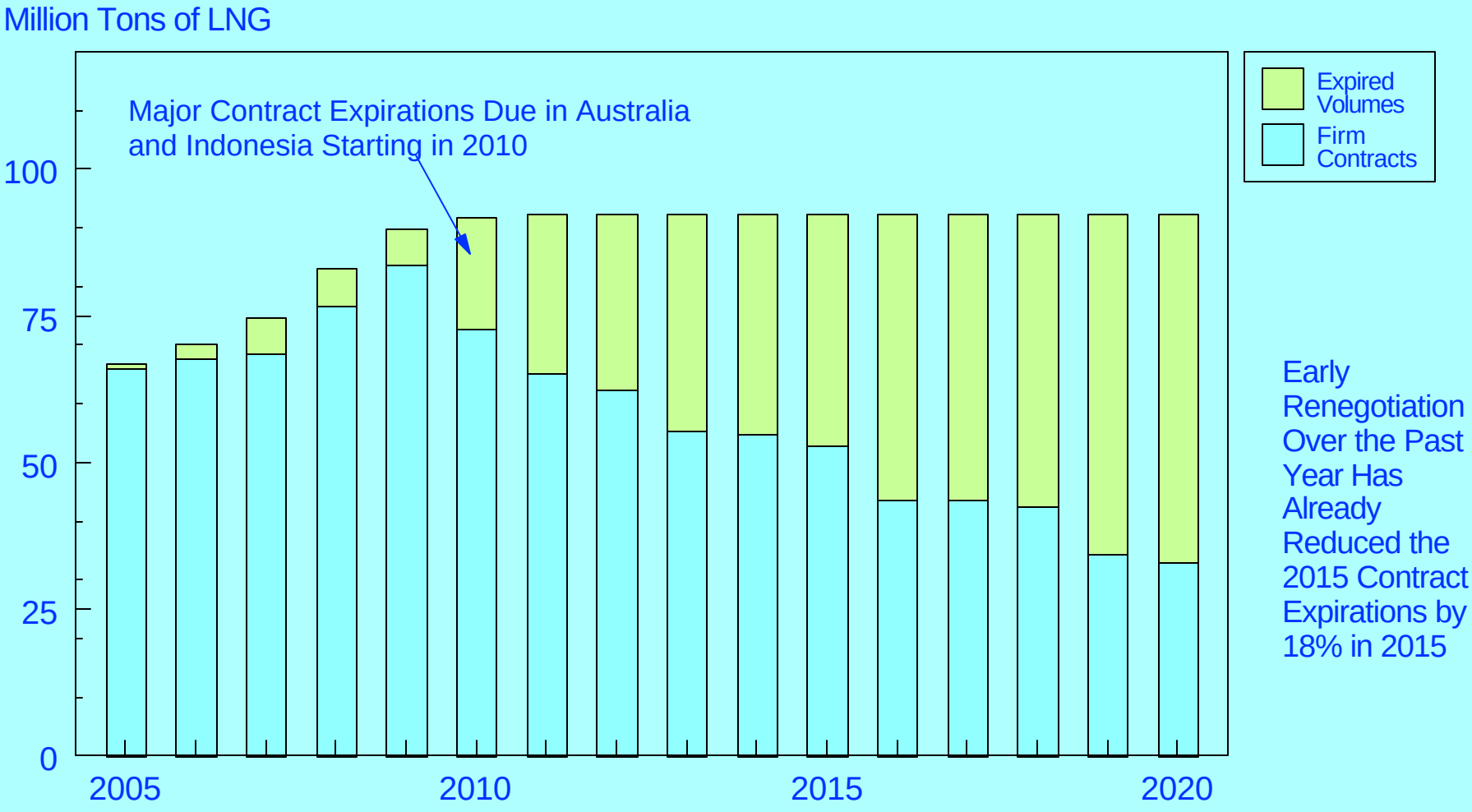
ONE OF THE MAJOR UNCERTAINTIES IN THE CURRENT PACIFIC BASIN LNG MARKET IS THE IMMINENT EXPIRATION OF AUSTRALIAN AND INDONESIAN CONTRACTS

- This Has Given Buyers Some Incentive to "Wait and See" How the Current Tight Market Plays Out
- China Was Able to Extract Very Favorable Contract Terms Before the Tight Market Uncertainties Made Sellers More Wary
- Now a Common Perception is That Those Terms Will Not Soon be Repeated
- But the Conflict Between Current Market Tightness and Looming Contract Expiration Will be a Significant Factor in New Contract Negotiations Over the Remainder of This Decade

Figure 13
SCHEDULE OF PACIFIC BASIN CONTRACT EXPIRATION VOLUMES COMPARED WITH TOTAL CONTRACT COMMITMENTS
MM TONS OF LNG



MAJOR NEW PROBABLE OR POSSIBLE SUPPLY SOURCES AVAILABLE TO PACIFIC BASIN MARKETS (DOES NOT INCLUDE OPERATING OR FIRM PROJECTS)

- **PACIFIC BASIN - MULTIPLE TRAIN POSSIBILITIES**
- Australia - Gorgon
  Very Large Complex, Particlularly if Giant Janz is Added; Some Quality and Liquids Yield Issues
- Australia - Browse
  Scott Reef - Possibly Australia's Largest Field
- Bolivia
  Very Large Reserves of Landlocked Gas But Severe Political Problems; Radical Left Opposed to Private Sector Ownership of Reserves and LNG Outlet Through Chile Which Conquered Seacoast in 1879; Radicals Engineered Tax Increase and Fall of One Government; Threaten Current One

- Indonesia - Tangguh
  - BP Operator; First Train Committed to China, Baja
- Russia - Sakhalin 2
  - Shell Operator; First Train Committed to Japan, Baja; Gazprom's Acquisition of Interest in Block May Influence Development
- Russia - Sakhalin 1
  - ExxonMobil Operator; Attempted Pipeline Outlet to Japan; Now Working on China Option; If Pipeline Options Fail, Large Reserves to Support LNG Projects
- Russia - Sakhalin 3/6
  - Not Yet Licensed for Development, But Very Large Reserves Indicated

- **PACIFIC BASIN - SINGLE TRAIN POSSIBILITIES**
- Australia - Pilbara
  - Scarborough Field; Possible Basis for Cabrillo Port Terminal
- Australia Timor ZOC - Sunrise
  - On Track to be Next Australian Project Until East Timor Disputed the Terms; Now Apparently Revived
- Indonesia - Bontang
  - Decision to Proceed Clouded by Status of Production Sharing Agreements
- Indonesia - Donggi
  - Some Question About Potential Reserves
- Brunei
  - Expansion Might be Possible
- Peru - Camisea
  - Reserves Sufficient for Domestic Market and One Export Train, May Go to Lazaro Cardenas

- **PACIFIC BASIN SOLD OUT**
- Alaska Cook Inlet
- Malaysia - Tiga
  Some Still Uncommitted
- Australia Timor ZOC - Bayu Undan

- **MIDDLE EAST - MAJOR AVAILABLE SUPPLIES**
  Qatar
  Iran

- **MIDDLE EAST - SOME UNCOMMITTED CAPACITY**
  Oman
  Yemen

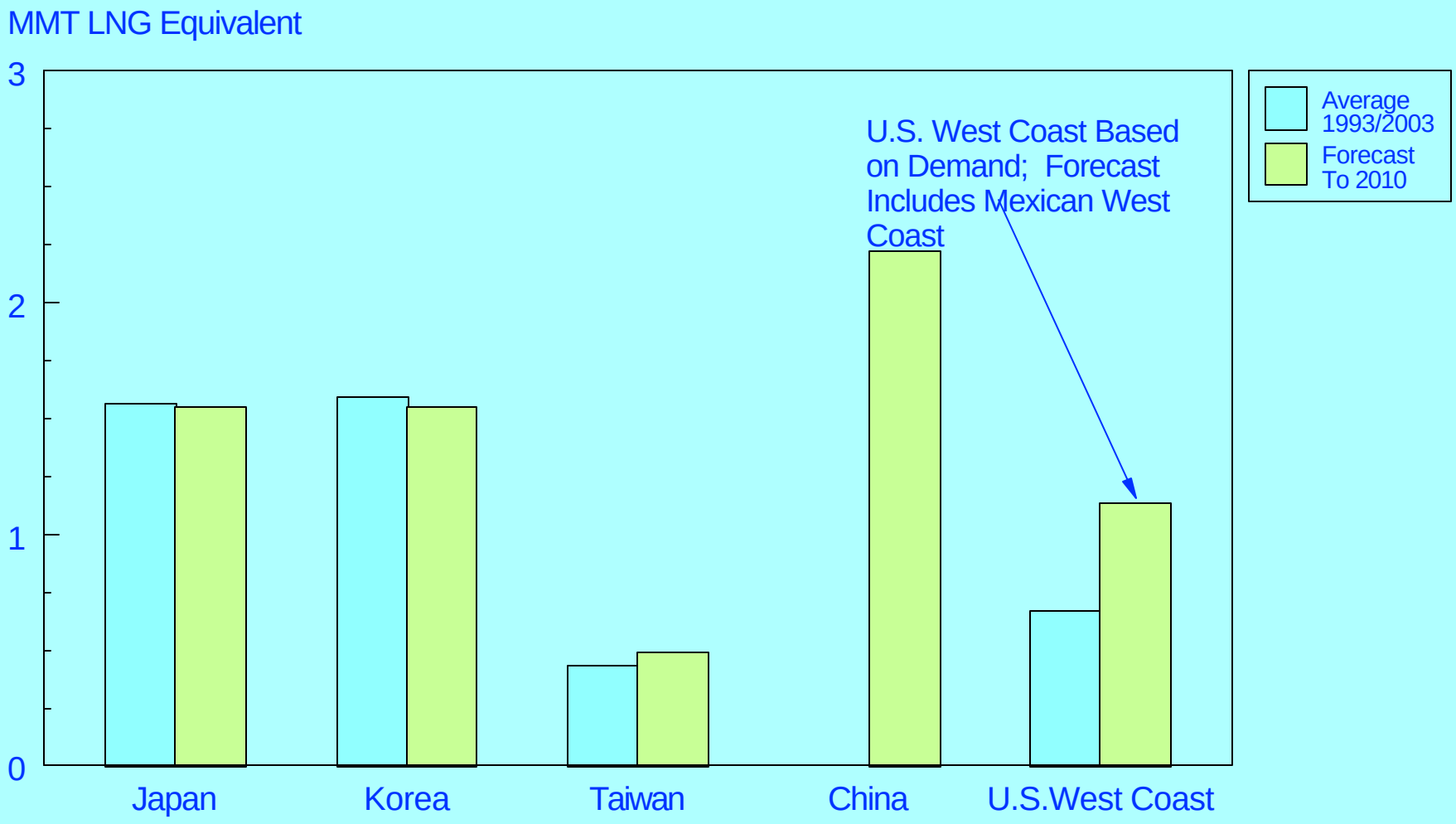
ASIA PACIFIC IMPORT DEMAND HAS INCREASED AT ABOUT 4 MILLION TONS OF LNG EQUIVALENT OVER THE PAST DECADE

- Projections Based on IEA, EIA and Trade Press Estimates Suggest it Might Increase to Nearly 7 Million Tons per Year Out to 2010
- This is Slightly More Than One Typical Current LNG Train (Less than One Super-Train from Qatar, However)
- But This Projection Includes Pipeline Imports - Very Likely in the Case of China, and Possible in the Case of Korea and Japan
- Increases in the West Coast of the U.S. and Mexico Are Taken as Incremental Demand

Figure 14

ASIA PACIFIC AVERAGE ANNUAL INCREMENAL GAS IMPORTS (INCLUDING PIPELINE IMPORTS) - HISTORY AND FORECAST TO 2010

MILLION TONS OF LNG EQUIVALENT [1]



[1] Jensen Estimates Based on IEA, EIA and Trade Press

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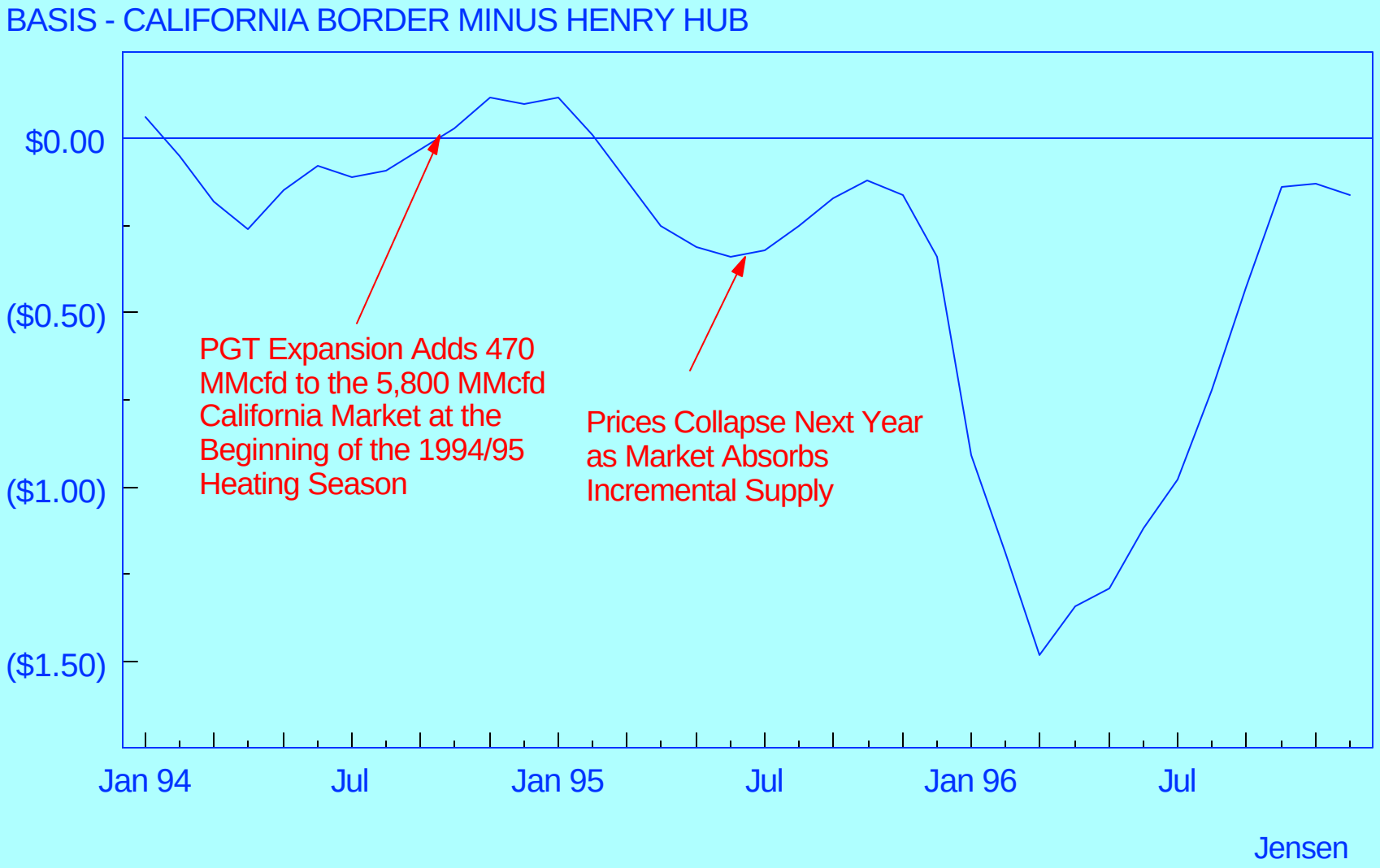
THE OUTLOOK FOR PACIFIC RIM DEMAND

- Japan - After a Temporary Slowdown, Resumption in Growth - Question About Implications of Nuclear Problems
- Korea - Continued Growth - Questions About Privatization of Kogas and Industry Access to LNG
- China - The Great Enigma - A Society in Transition From a "Command-and Control" Economy to a Market Economy
  - It Can Build Infrastructure with its "Command Hat" On
  - Can it Build Demand with its "Market Hat" On?
- Illustrations of the Issues in China - The High Price of Gas Compared With Coal; The Inability to Fill Up Earlier Pipeline Projects
- California - A Vivid Illustration of "Basis Risk" Which Can Occur in an Overloaded Market

Figure 15

"BASIS RISK" - COLLAPSE OF THE BASIS DIFFERENTIAL BETWEEN THE CALIFORNIA BORDER AND HENRY HUB FOLLOWING THE 1994 EXPANSION OF PACIFIC GAS TRANSMISSION FROM ALBERTA

THREE MONTH MOVING AVERAGE



THE EMERGENCE OF PRICE ARBITRAGE IN GLOBAL LNG MARKETS

- An Active Price Arbitrage Market Has Developed in the Atlantic Basin, Which Shifts Volumes Among Trinidad and Nigerian Supply on the One Hand and U.S. and Spanish Markets on the Other

- Another Arbitrage Market is Emerging Between the Pacific Basin and the Atlantic Basin by Using the Ability of the Middle East to Ship East or West Thus Sending Price Signals Between the Two Markets

- The Fact That the Flexible Supply Can Move to the Market With the Best Netback is Illustrated by the Experience of the U.S.'s Four Regasification Terminals

- During the Winter of 2000/2001, Companies Controlling U.S. Regasification Capacity Could Make Extraordinary Profits by Buying in the Distressed LNG Short Term Market and Selling into the High Priced U.S. Market

- But the Following Year Europe Outbid the U.S. for That Supply and U.S. Terminal Capacity Was Idled

- Then, In Late 2002, a Shutdown of 15 Nuclear Plants by Tokyo Electric and a 2003 Fire at Malaysia's Tiga Plant Upset World LNG Supply/Demand Balances and Tanker Availability Patterns to the Detriment of U.S. Markets

- The Effect on U.S. Terminal Capacity Operation is Shown in Figure 16

- The Way in Which the Pricing Arbitrage Works in the Atlantic Basin is Illustrated in Figure 17 and in the Middle East in Figure 18

Figure 16
COMPARISON OF U.S. LNG TERMINAL IMPORTS WITH CAPACITY
MILLION CUBIC FEET PER DAY

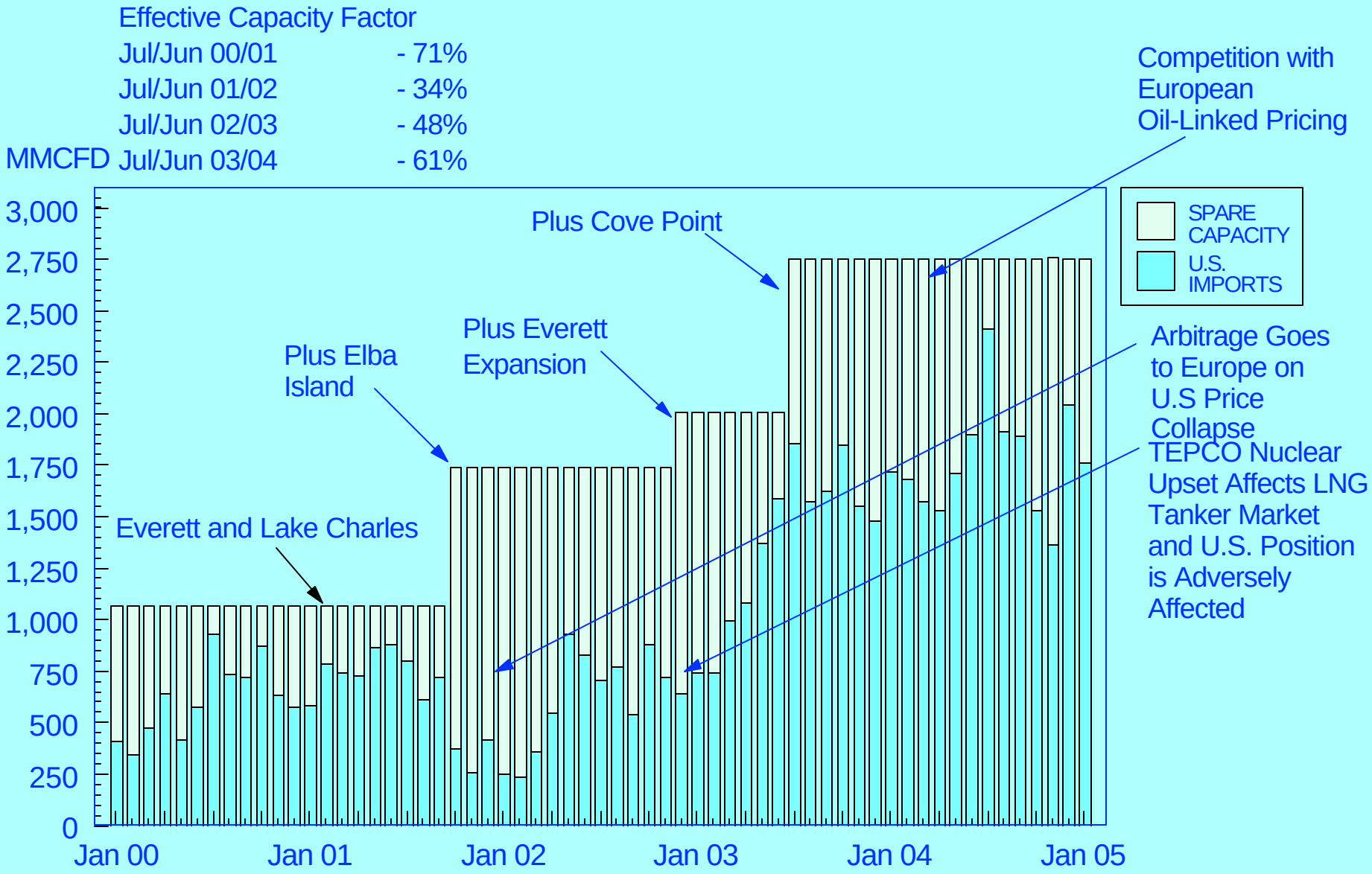
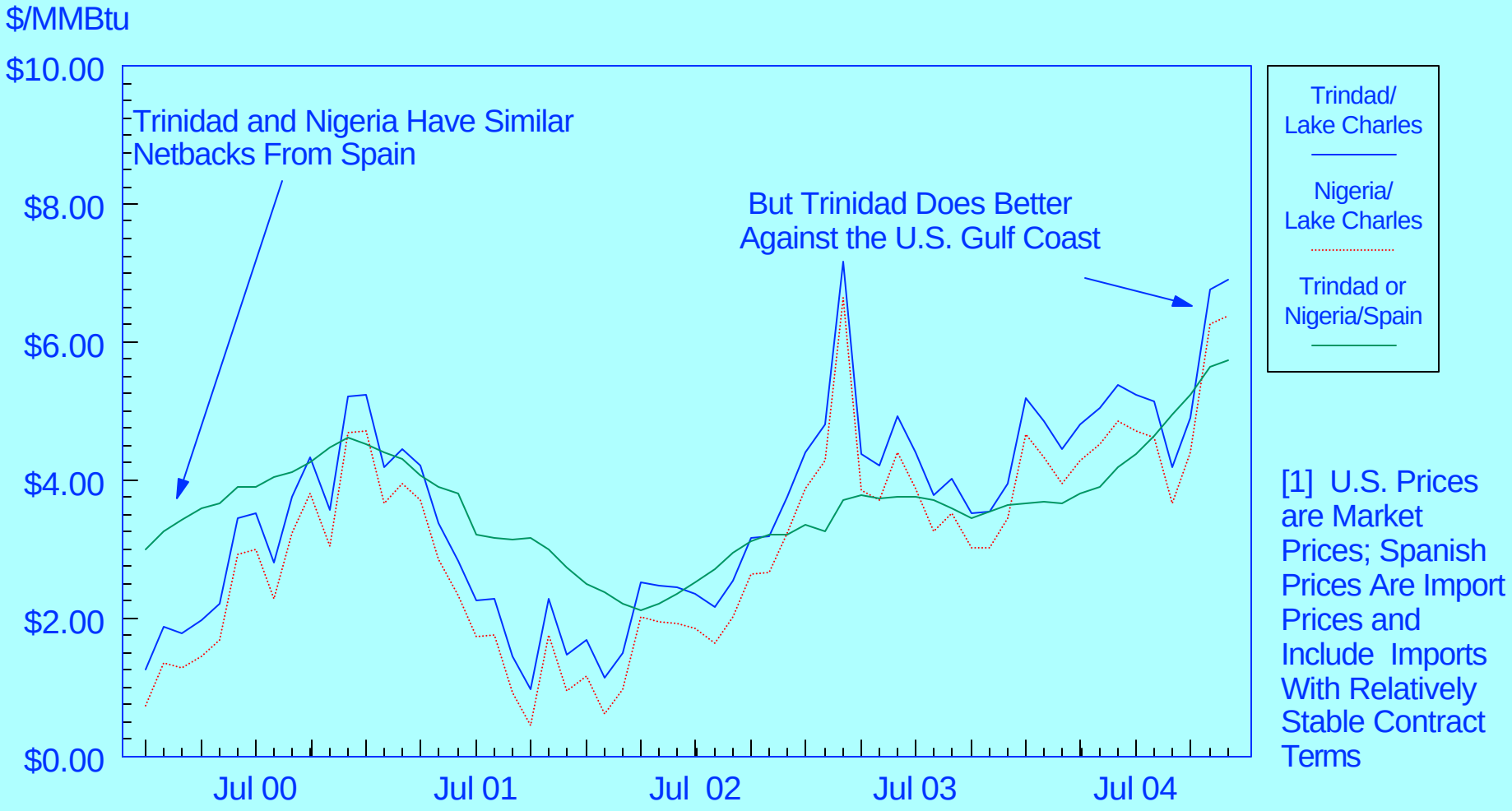


Figure 17

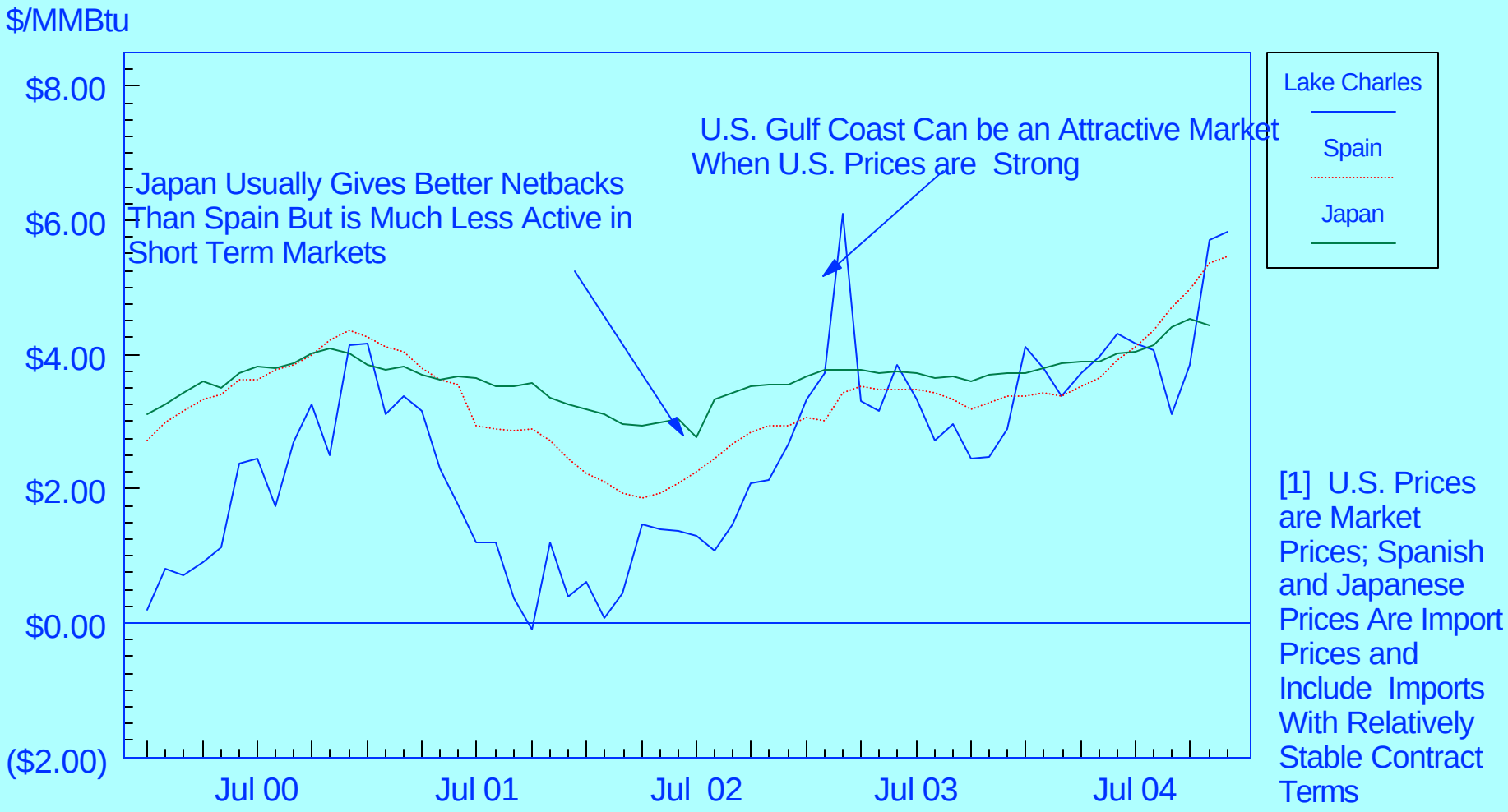
ILLUSTRATIVE NETBACKS [1] FOR SELECTED ATLANTIC BASIN ARBITRAGE PATTERNS - TRINIDAD AND NIGERIA TO SPAIN AND U.S. GULF COAST



[1] U.S. Prices are Market Prices; Spanish Prices Are Import Prices and Include Imports With Relatively Stable Contract Terms

Figure 18

ILLUSTRATIVE NETBACKS [1] FROM THE U.S. GULF COAST, SPAIN AND JAPAN TO THE MIDDLE EAST SHOWING ARBITRAGE PATTERNS



[1] U.S. Prices are Market Prices; Spanish and Japanese Prices Are Import Prices and Include Imports With Relatively Stable Contract Terms

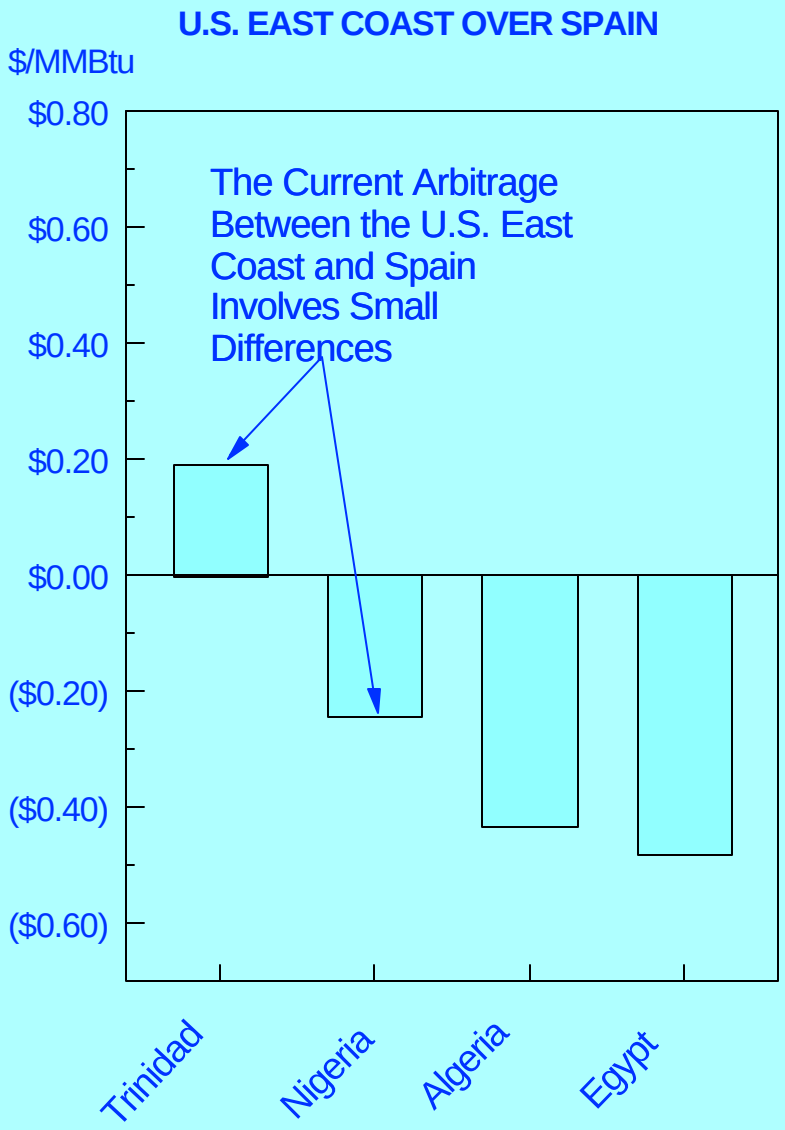
PRICE ARBITRAGE WILL BE MUCH MORE DIFFICULT IN THE PACIFIC BASIN THAN IT IS IN THE ATLANTIC BASIN

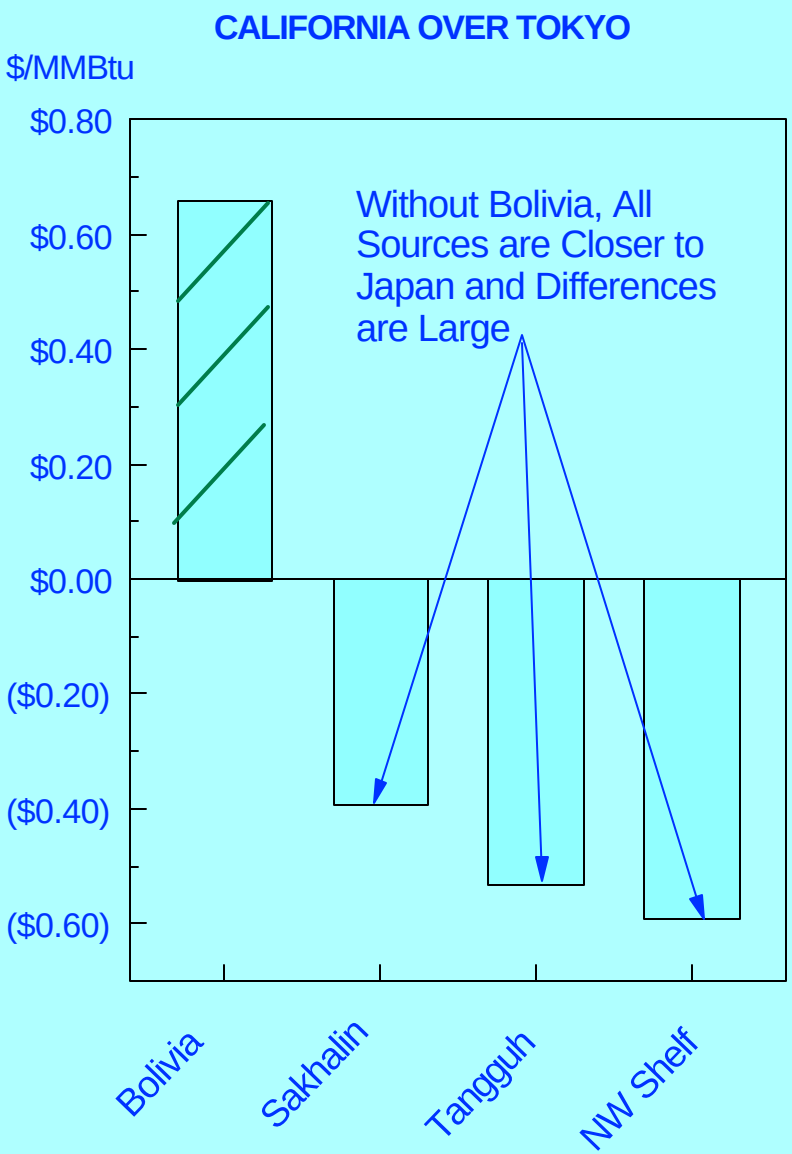
- Distances are Much Longer Making Heavier Demands on Tanker Capacity Than is the Case in the Atlantic
- To Deliver an Equivalent Amount of LNG from Australia to California on a Short Term Trade Requires Twice the Tanker Capacity as Does a Delivery to Japan
- And Absent a West Coast Supply, Such as Bolivia, There is no Western Hemisphere Arbitrage Partner to Play the Role that Trinidad Does in the Atlantic

Figure 19

ILLUSTRATIVE TRANSPORTATION ADVANTAGES/(DISADVANTAGES) FOR U.S. ATLANTIC AND PACIFIC DESTINATIONS RELATIVE TO EUROPE AND JAPAN

ASSUMING 138,00 CUBIC METER TANKERS



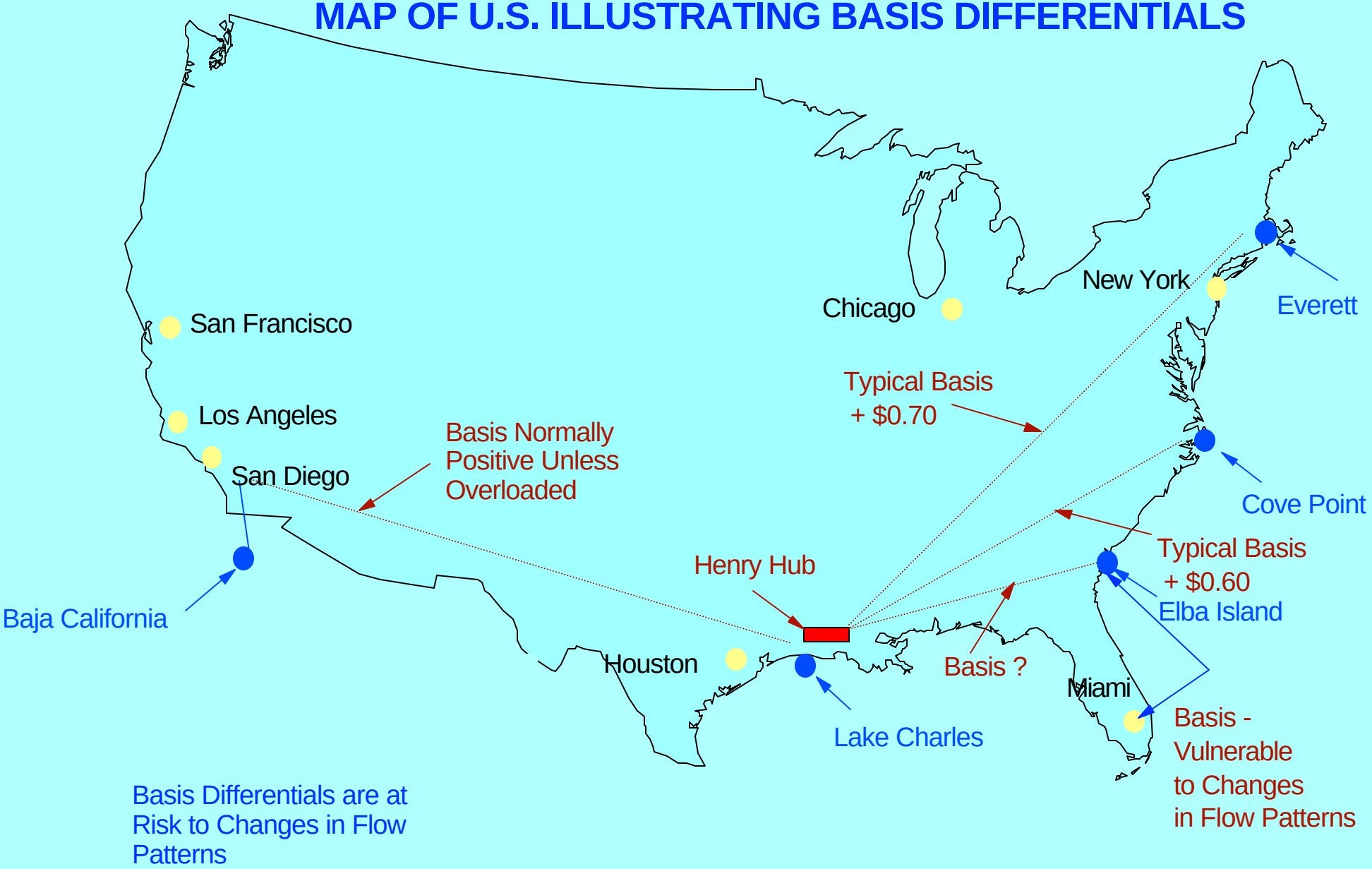


IN RESTRUCTURED MARKETS, SUCH AS THOSE IN NORTH AMERICA, COMMODITY COMPETITION SETS THE GAS MARKET PRICE

- The Price Reference Point Used for North American Trading is Located at Henry Hub in South Louisiana
- Market Pricing for Other Pipeline "Hubs" is Commonly Related to the Henry Hub Price by Means of "Basis Differentials"
- While These Basis Differentials Will Change With the State of the Market, They Roughly Approximate the Costs of Transporting Gas From South Louisiana to the Market in Question
- Figure 20 is a Simple Illustration of the U.S. Basis Differential System

Figure 20

MAP OF U.S. ILLUSTRATING BASIS DIFFERENTIALS



THE U.S BASIS DIFFERENTIAL SYSTEM WITH ITS CENTERPIECE AT HENRY HUB OFFERS A POSSIBLE MODEL FOR GLOBAL LNG PRICING

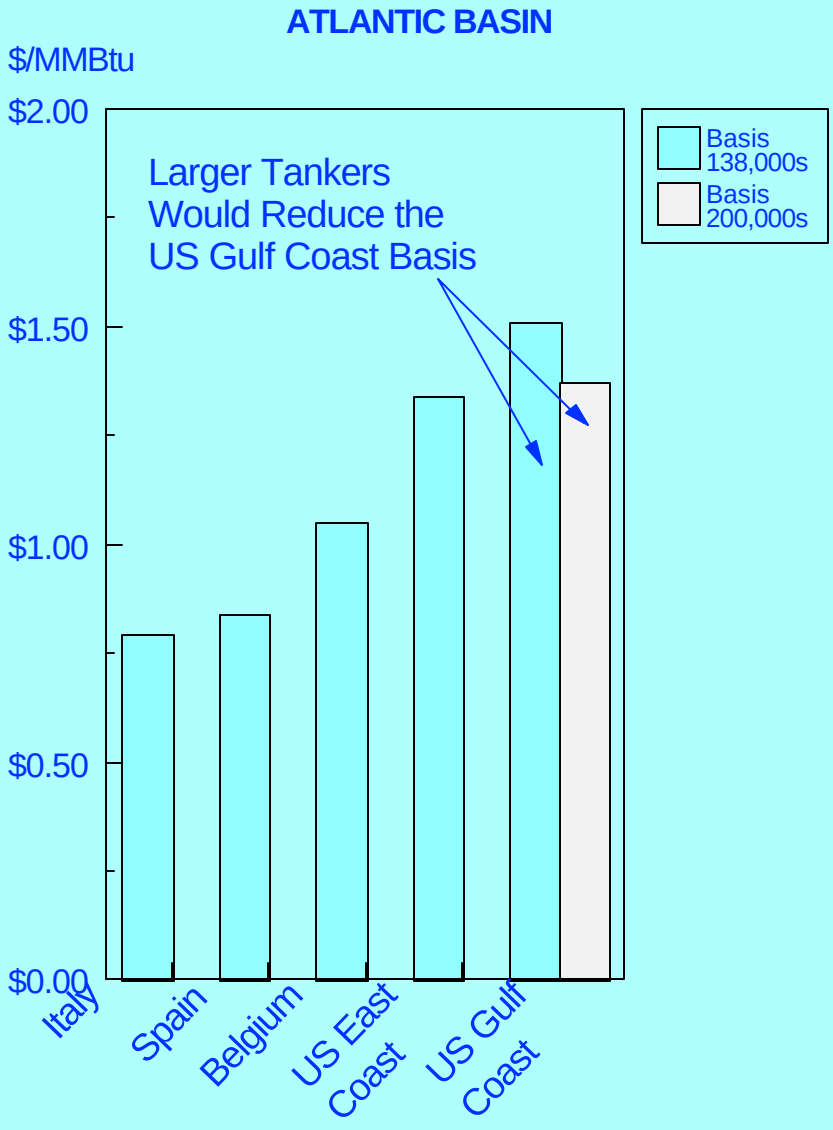
- The Ability of the Middle East to Ship East or West, as Prices Dictate, Suggests that Qatar is the Logical Pricing Reference Point - The "Henry Hub of LNG"
- By Such a Standard, North American Atlantic Markets are at the Greatest Transport Distance from Qatar and Should Command Higher Differentials Than Europe
- If Larger Tankers are Utilized for the U.S. Gulf Coast, This Would Have the Effect of Reducing its Basis Differential

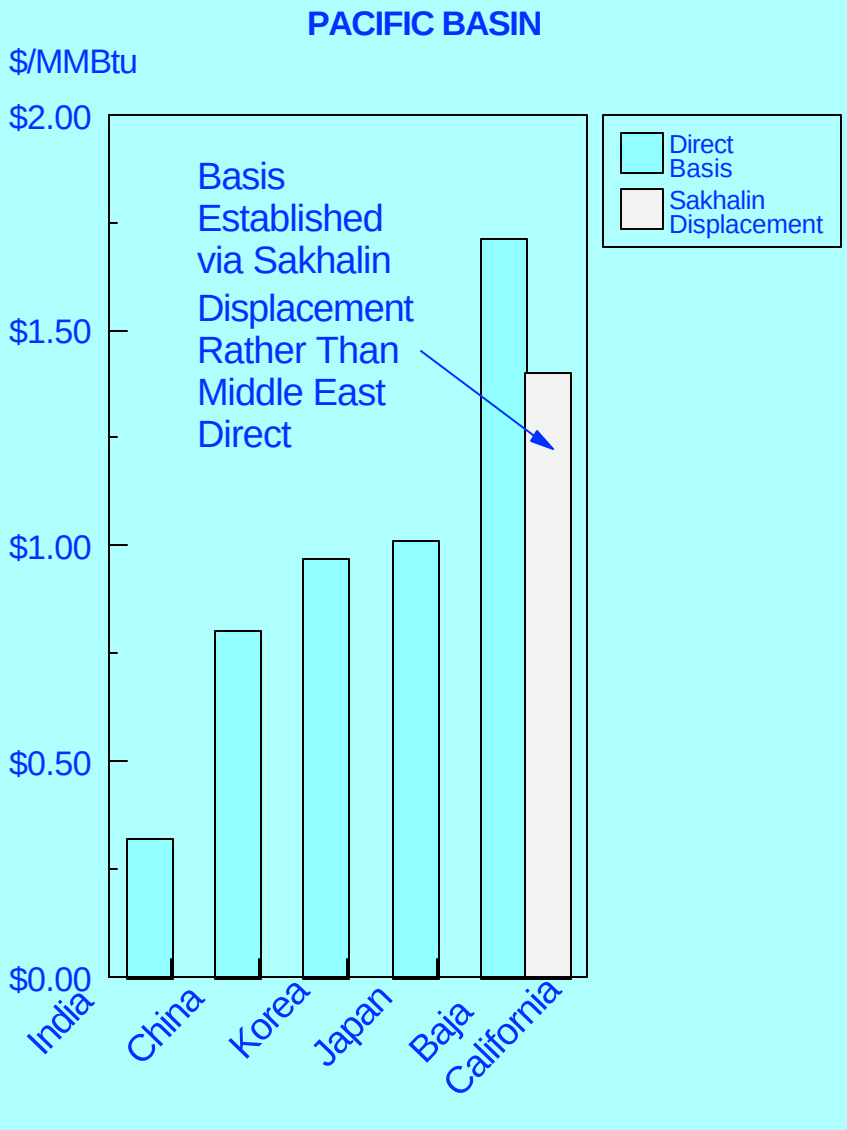
- The Pacific Basin is More Complicated
- It is Cheaper to Displace Pacific Basin Supplies from Northeast Asia to the North American West Coast than it is to Ship Directly from Qatar
- Figure 21 Illustrates a Selected Group of Basis Differentials Using Qatar as the LNG "Hub", Including Sakhalin Displacement to Establish the West Coast Basis

Figure 21

ILLUSTRATIVE BASIS DIFFERENTIALS ASSUMING THE LNG "HUB" IS SET IN THE MIDDLE EAST

ASSUMING 138,00 CUBIC METER TANKERS





IN CONCLUSION

- With the Rapid Growth of European and North American Markets Together With Growth in Atlantic Basin and Middle East Supply, LNG is Becoming More of a Global Commodity

- Long Term Contracts Will Remain, But the Emergence of "System Contracting" and Short Term Trading Will Make the Old "Destination Contracting" More Flexible

- Import Terminals Represent the Transition Facilities Between two Different Operating Models of Gas Competition - "Commodity Supply" and "Project Supply"

- A Decision to Require Open Access for Terminals Must Weigh the Advantages of Greater Commodity Competition Against the Possible Risks to LNG "Chain" Investment

- Pricing Arbtrage in the Atlantic Basin Will Tend to Link North American and European LNG Pricing, While Middle East Price Arbitrage Will Tend to Link Asian and Atlantic Basin Pricing

- Pacific Basin Arbitrage Will be Complicated by the Large Distances Involved and by the Fact that, Without Bolivia, the Pacific Basin Lacks a Viable Western Hemisphere Arbitrage Partner

- Qatar May Become the "Henry Hub" of Global LNG Pricing